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(54) FLAT STRUCTURES MADE OF METAL PLANKS

(71) We, SWISS ALUMINIUM LTD., a Company organized under the laws of Switzerland, of Chippis (Canton of Valais), Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The side walls for goods lorry platforms, and also for railway goods wagons, and similar constructions of flat surfaces, are made to an increasing extent out of light metal extruded planks. In such constructions, a number of separate planks corresponding to the desired height of wall are assembled edge to edge, and the ends of the planks are restrained by boundary strips, which are usually U-shaped. In order to hold these planks together with the necessary firmness against all loads which may occur, a great number of different proposals have already been made. In most cases the longitudinal edges of the planks are so constructed that they interlock by means of hook-shaped elements or by resilient snapping together of special parts. The assembly of such planks often requires troublesome combined displacement, rotation and swinging movements. Such planks must be made very accurately to size, and this brings with it problems in extrusion and straightening. Furthermore they are often delicate and can easily be damaged in transport, storage and assembly, so that often a further treatment is necessary before assembly, in order that the planks can be fit again for use. Such plank connections are often alone insufficiently firm and must be reinforced with the help of tension anchors. This signifies complicated additional work, and in many cases involves parts projecting from the wall surfaces.

Plank connections are also known, in which adjacent longitudinal edges define a cavity, in which coupling elements must be driven, so that the connection holds together.

A side wall of light metal planks should  
 [Price 25p]

be simple to assemble, i.e. with movements which are simple, and if possible straight in one direction, and indeed advantageously substantially transverse to the longitudinal axis of the planks. No additional treatment, such as boring of holes, attachment of tension anchors, driving of coupling elements, should be necessary for holding the planks together. Projecting parts should not be present either on the inside or on the outside of the wall. Above all, however, the wall should be equal to all pressure and tension loadings which may arise, easily dismantled in case of repair, as little as possible sensitive to tolerances, and not susceptible to damage in transport. But none of the known constructions satisfies all these requirements at the same time.

The present invention satisfies the requirements. In a flat structure of metal planks assembled edge to edge, according to this invention, the ends of the planks are restrained by boundary strips against movement perpendicular to the plane of the structure (as herein defined), and the edges of the planks interlock by longitudinal slot and tongue, and at least one such slot and cooperating tongue have each two flat surfaces for engaging the other, and all these surfaces are parallel to each other and arranged at an angle of 10° to 80° to the plane of the structure.

By "the plane of the structure" we mean a plane containing directions parallel to the directions of the two major extents of the structure.

By the "height" and "breadth" of any of the slots or tongues we mean the dimensions of that slot or tongue in a plane perpendicular to the longitudinal extent of the slot or tongue, firstly in the plane of the structure and secondly perpendicular to the plane of the structure.

The accompanying drawings explain the invention by way of examples. They show in cross section a series of constructional possibilities for the planks. Figures 1 to 4 show constructions in which the interlock-

ing longitudinal edges are made dissimilar, and Figures 5 to 8 show constructions with similar formation of both longitudinal edges.

Figure 1 shows the fundamental principle of the plank connection. The planks 1 and 2 made of extruded hollow strips are placed on one another to form a structure according to the invention, e.g. a side wall of a goods lorry. Instead of the single cavity hollow strips shown, multi-cavity strips subdivided by transverse walls, or strips wholly of material can be used. The only important thing is the shape of the longitudinal edges.

The planks have on their lower edges a slot 3 open towards the adjacent plank. Its sides 4 and 5 extend parallel to one another and form with the surfaces of the wall an acute angle 6. This can amount to between 10 and 80°; preferably it is between 10 and 45°.

On the upper longitudinal edge of the planks there is arranged a tongue 7, the sides 8, 9 of which make the same angle 6 with the wall surfaces as do the sides 4, 5 of the slot 3.

This formation of the plank edges permits one to place the planks on one another with a rectilinear motion in the direction of the oblique slot sides 4, 5 and tongue sides 8, 9. If the assembled planks are then enclosed at their ends with the usual boundary strips, usually U-shaped (not shown), then this oblique arrangement of the slot and tongue resists separation of the planks in the direction of the wall surface.

Tilting of one plank relative to the others is, to a certain extent, hindered by the U-shaped enclosing strips at the ends of the planks. Since, however, these enclosing strips are only applied to, and can only be fully effective at, the plank ends, but on the other hand the planks often have a substantial length (e.g. 3,000 to 4,000 mm), the direct connection of the planks must be so formed that it is also effective against tipping and twisting loads over the entire length of the planks. To achieve this, advantageously the ratio height: breadth (H:B Figure 2) of the slot and tongue is chosen with a magnitude of at least 1:1. It is more advantageous if the height is greater than the breadth.

The effectiveness against tipping and twisting can be strengthened, if in the longitudinal edge carrying the tongue, adjacent to the base of the tongue, there is introduced at least one groove 10 open towards the adjacent plank, in which engages a rib 11 arranged on the longitudinal side which carries the slot (Figure 3). However the groove can also be arranged in the slot side and the rib on the tongue side (Figure 2). Also at the bottom 12 of the slot there can for example be provided a further longitudinal rib 13

directed towards the tongue, which engages in a corresponding recess 14 in the head of the tongue and thus increases the resistance of the connection against loads directed transversely to the wall surface (Figure 2).

Then also each longitudinal edge can carry both a slot and a tongue either singly or multiply, so that a kind of toothing arises (Figures 4 to 8). In addition the edge parts 15 of one plank can overlap or underlap the edge parts 16 of the adjacent plank in the direction of the wall surface (Figures 4, 7, 8), which gives to the wall an increased stiffness in bending.

If each longitudinal side has a slot and a tongue, it is possible to make both longitudinal sides similar (Figures 5 to 8). This signifies a simplification of assembly for in this case it is not necessary to take care that only matching longitudinal sides are put together.

The planks and boundary strips can be manufactured simply and economically by extrusion of suitable aluminium alloys. The assembly is simple, as will be understood, and produces a smooth, water-tight, rigid, and strong wall. If repairs or replacement of individual parts are necessary, the wall can equally simply be dismantled.

Of course the construction can, apart from side walls of goods lorries, be used also for building of dividing walls in rooms and especially in all circumstances where flat structures must be produced rapidly and with simple means.

#### WHAT WE CLAIM IS:—

1. A flat structure of metal planks assembled edge to edge, in which the ends of the planks are restrained by boundary strips against movement perpendicular to the plane of the structure (as herein defined), and the edges of the planks interlock by longitudinal slot and tongue, and at least one such slot and cooperating tongue have each two flat surfaces for engaging the other, and all these surfaces are parallel to each other and arranged at an angle of 10° to 80° to the plane of the structure.

2. A structure according to claim 1, in which the planks are hollow strips.

3. A structure according to claim 1 or claim 2, in which the longitudinal edge of a plank having the tongue has also at least one groove extending longitudinally parallel to the tongue and facing towards the abutting plank, and the longitudinal edge having the slot has also at least one longitudinal rib engaging in the groove of the abutting plank.

4. A structure according to claim 1 or claim 2, in which at the bottom of the slot there is at least one longitudinal rib directed towards the tongue, and in the head of the

tongue there is a reces, in which the rib engages.

5 5. A structure according to claim 1 or claim 2, in which one of the edges carrying the said slot and tongue includes a part which provides a prolongation of a face of the respective plank, parallel to the plane of the structure, and this prolongation overlaps the other plank.

10 6. A structure according to any of claims 1 to 5, in which the same longitudinal edge of a plank has one or more slots and one or more tongues.

15 7. A structure according to claim 6, in which the said plank has an identical arrangement of one or more slots and one or more tongues on both of its edges.

8. A structure according to any of claims 1 to 7, in which the ratio of the height to the breadth (as herein defined) of the slot and tongue amounts to at least 1. 20

9. A structure according to claim 8, in which the height of the slot and tongue is greater than the breadth.

10. A structure according to claim 1, 25 substantially as described with reference to any of the Figures of the accompanying drawings.

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COMPLETE SPECIFICATION

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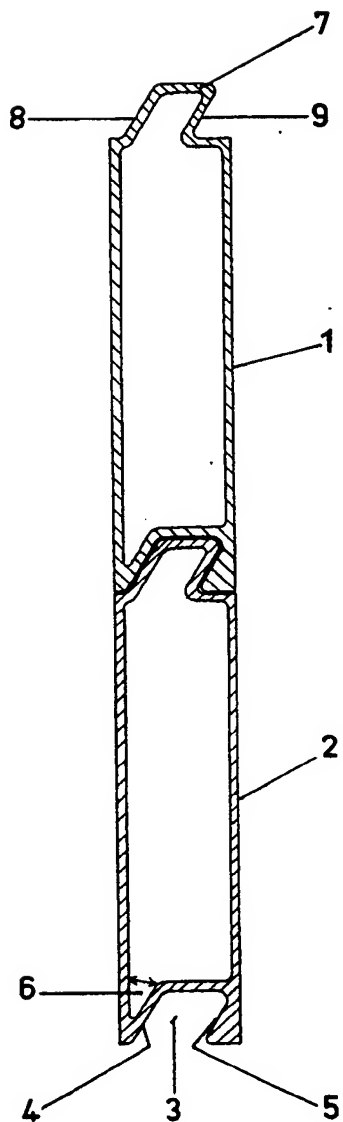
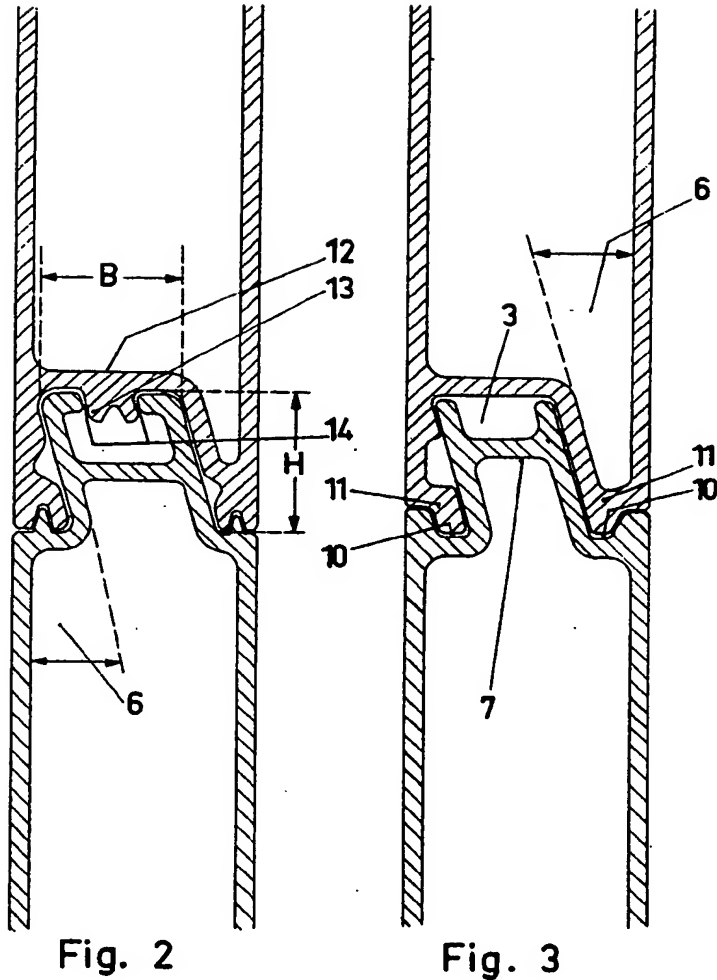


Fig. 1

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Sheet 3

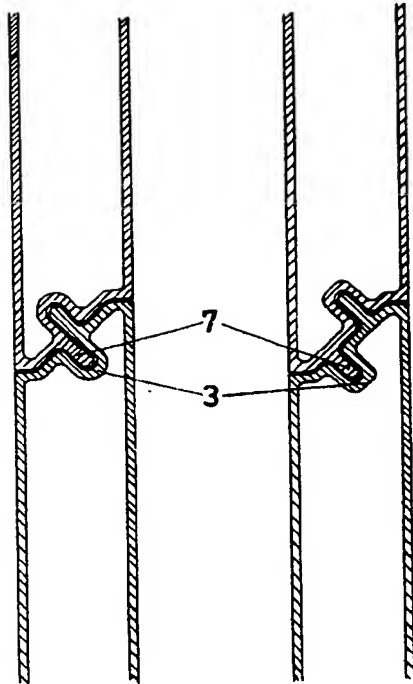


Fig. 6

Fig. 5

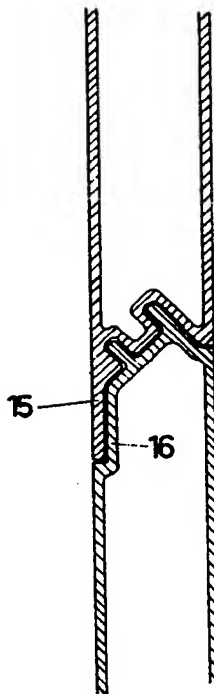


Fig. 4

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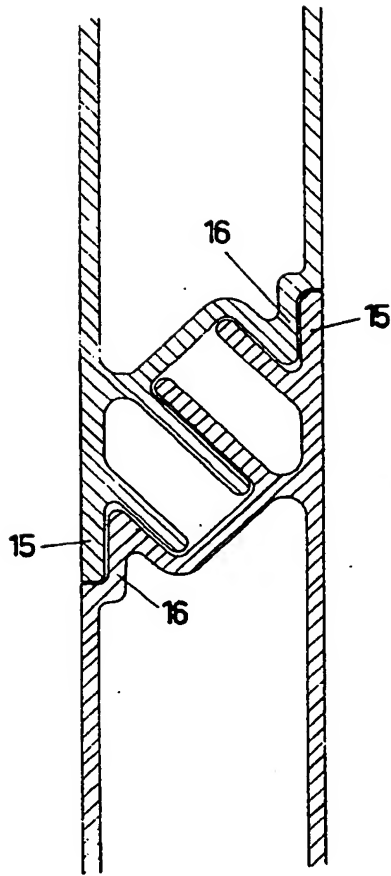


Fig. 7

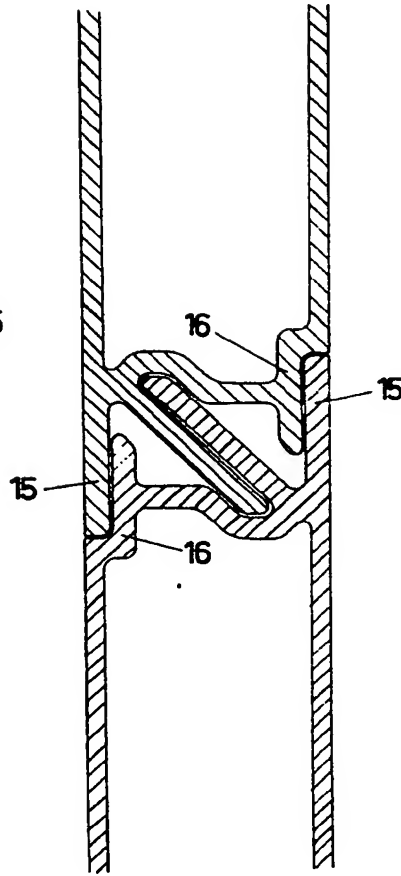


Fig. 8

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